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NEW WHEAT CULTIVARS AND LONGEVITY OF RUST RESISTANCE, 1971-75

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NEW WHEAT CULTIVARS AND LONGEVITY OF RUST RESISTANCE, 1971-75

By

R. A. Kilpatrick [1]

SUMMARY

Replies from plant breeders and pathologists in world wheat producing countries indicated that they had released 281 cultivars for commercial or germplasm purposes from 1971 to 1975. The population of leaf, stem or stripe rust was reported to have changed in 26 countries, varying from 1 to 15 years and type of rust involved. Longevity of cultivar resistance was found to vary with cultivar, country, type of rust, and area of cultivation. The nursery material of the IRN has been utilized in 54 countries and has played, and continues to play, a vital role in cereal breeding programs around the world.

In 1968, a request was made of plant pathologists and breeders around the world to supply names of new wheat cultivars and year of release for commercial or germplasm purposes [2]. The response to this request was 81 percent. Results showed progress of active breeding programs and adaptability of many wheat cultivars planted throughout the world. During the intervening years additional replies were received and new cultivars have been released, although no single publication contains all the information.

Cultivars oftentimes appear to lose their rust resistance. This is due to development of virulent biotypes or cultivation in areas of nonadaptability.

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[2] Kilpatrick, R. A. Varieties of wheat made available throughout the world, 1962-70. U.S. Agr. Res. Serv. ARS 34-117, pp 24. 1970.

New cultivars generally have better disease resistance and improved agronomic characteristics. Information on longevity of cultivars from the standpoint of rust resistance is lacking. Therefore, I requested information from wheat breeders and pathologists in 112 countries on: (a) Name of cultivar and year of release for commercial or germplasm purposes; (b) longevity of cultivars that remained resistant to leaf, stem, or stripe rust with specific example; and (c) if they had utilized any material from the International rust nursery program in their breeding program.

Replies were received from 59 percent of the individuals in 73 percent of the countries. Individuals from 37 countries and 27 States indicated that they had released 281 cultivars for commercial or germplasm purposes from 1971-75 (table 1). Of the information returned, the nine countries releasing the most number of cultivars were: United States (106), USSR (29), Argentina (13), the Netherlands (13), Australia (12), Brazil (12), England (11), Yugoslavia (10), and Kenya (8). Replies from 27 States within the United States indicated that they had released 106 cultivars. Some replies contained names of new cultivars not previously listed 2/. Individuals from 30 countries reported that they had released 132 cultivars from 1967 to 1970. This is in addition to that previously listed (table 2). Additional cultivars possibly were released. Recordkeeping or failure, or both, to make proper contact by correspondence prevented obtaining the necessary data.

Replies from 26 countries and 10 States within the United States contained information relating to frequency of changes within the rust population of stem, leaf, or stripe rust and rust reaction of specific cultivars (table 3). Numerous replies indicated that no information was available from their country. Others replied that they hoped to obtain this type of information within a short period. Individuals returning information indicated that the frequency of change varied between countries, ranging from 2 to 12 years for stem rust, 1 to 15 years for leaf rust, and 1 to 10 years for stripe rust. Average change for the three rusts varied from 5.3 to 5.6 years. Factors believed to be responsible for affecting race changes are prevalence of alternate and susceptible hosts, and environmental conditions conducive for disease development.

Longevity of cultivars varies within and between countries and with kind of rust which they were originally selected. When cultivars were grown in a nonadapted area or altitude, they were found to be susceptible to the existing population of rust. This example occurred in New Zealand and also in Kenya. Some cultivars were found to be susceptible within 1 to 4 years of release while others such as 'Lutescens 62 and Erithrospermum 841' had been cultivated in the USSR for a period of 45 years and still occupied a large area of cultivation. Apparently the rust population is fairly stable or the two cultivars contain good field resistance to withstand the rust attacks over that period of time. Factors affecting longevity are available records on released cultivars, virulence of rust population, insufficient screening of introduced cultivars, and unusual weather conditions favoring disease epidemics.

Since 1950 the International rust nursery (IRN) program has made outstanding contributions to breeding programs and human relations around the world 3/, 4/. Breeders and pathologists in 54 countries and 20 States indicated that the IRN had served as a valuable source of germplasm for their program or in several cases, the entries in the nursery were superior to their breeding materials. Consequently, they made selections and developed a new cultivar which they released jointly with the original breeder. Recent examples have been Republic of South Africa - University of Nebraska and Chile - Purdue University. Within the IRN program we stress the value of germplasm exchange and cooperation among personnel. We also encourage acknowledgment and joint release of outstanding germplasm material developed from any of the nurseries.

3/ Kilpatrick, R. A. International rust nurseries -- a special article. International Biological Programme Aerobiology Newsletter No. 4 pp 2-5 August 1971.

4/ Loegering, W. Q., and N. E. Borlaug. Contributions of the International spring wheat rust nursery to human progress and international good will. U.S. Agr. Res. Serv. ARS 34-46, pp 8. 1963.

Table 1.--Wheat cultivars released throughout the world, 1971-75

Country and year released	Cultivar
Argentina:	
1971	Precos Parana INTA, Vangardia INTA
1972	Buck Naposta, Marcos Juarez INTA
1973	Balcarceno INTA, Buck Cencerro, Ciano 67, Dekalb Lapacho, Dekalb Tala
1974	Calden INTA, Dekalb Urunday, Diamonte INTA, Leones INTA
Australia:	
1971	Gambee, Maddem, Tarsa, Warimex, Wariquam
1972	Teal
1973	Cassia, Condor, Egret, Kite, Zenith
1974	Oxley
Brazil:	
1971	IAS-55, IAS-56
1972	IAS-57, IAS-58, IAS-59, IAS-60
1973	B-15, B-20, IAS-61, IAS-62
1974	IAS-63, IAS-64
Canada:	
1971	Frederick, Wascana
1972	Napayo
1973	Wakooma
1974	Macoun
Chile:	
1972	Panquifen
1973	Aurifen, Loncofen, Mexifen

Table 1.--Wheat cultivars released throughout the world, 1971-75--Continued

Country and year released	Cultivar
1974	Antufen, Melifen, Naofen
1975	Var. 10
Cyprus:	
1970-71	Pitic 62
Ecuador:	
1973	Cayambe, Romero
England:	
1971	Maris Dove, Maris Huntsman
1972	Bouquet, Maris Templar
1973	Atou, Maris Butler, Val
1974	Maris Freeman, Maris Fundin, Mega, Sappo
Ethiopia:	
1971	Laketch
1974	Mamba
Finland:	
1972	Tahti
France:	
1972	Chrismar, Durtal
Greece:	
1971	G 84909
1973	G 85458
Hungary:	
1971	MV-1, MV-2, Szegedi
India:	
1971	WG 357
1972	WG 377

Table 1.--Wheat cultivars released throughout the world, 1971-75--Continued

Country and year released	Cultivar
Israel:	
1971	Lakhish, Pan, Weizmann 240
1972	Hazera 18
1974	Bet Dagan, Yafit
Japan:	
1972	Sakigake-Komugi
1973	Hachiman-Komugi
Kenya:	
1971	Kenya Bongo, Kenya Kanga
1972	Kenya Mamba, Kenya Swara
1973	Kenya Kiboko, Kenya Nyati
1974	Kenya Kuro, Kenya Mbweha
Korea:	
1972	Shin Kwang
Lebanon:	
1972	Arz
Mexico:	
1971	Cajeme 71, Cocorit 71, Tanori 71, Torium 71, Vicam 71
1973	Jupateco 73
1974	Yoreme 74
The Netherlands: 1/	Bastion, Bongo, Cama, Caribo, Clement, Cyrano, Fundus, Kaspar, Lely, Melchior, Norda, Selpek, Toro
New Zealand:	
1972	Karamu
1974	Takahe

Table 1.--Wheat cultivars released throughout the world, 1971-75--Continued

Country and year released	Cultivar
Norway:	
1972	Runar
1974	Reno, Tautra
Pakistan:	
1971	SA-42
1973	Lyp-73, Pari 73, Pothwar, Sandal
Rhodesia:	
1971	Sashi
1974	Nuanetsi
Romania:	
1973	Ceres, Iulia, Lovrin 13, Turda 195
USSR:	
1971	Chitinskaya 1, Dueprov 521, Kirghiz Jubilee, Mirnov's Jubilee
1972	Aurora 72, Baskir 9, Caucasus 72, Leningradka, Kamyshinskava 3, Melanopus, Odessa Jubilee
1973	Albidum 114, Bezostaya 2, Ermovskaya 3, Grecum 114, Krasnodarskaya 39, Pirotrix 28, Rostovchanka, Saratovskaya 42
1974	Buryatskaya, Ilichevka, Kinel'skaya 30, Krasnokutka 6, Lutescens 44, Movkovskaya 21, Novosibirskaya 67, Orbita, Polesskaya 70, Priboi
Spain:	
1971	Averroes, Arpa, Montiei
Republic of South Africa:	
1974	Memnon, Sonderend

Table 1.--Wheat cultivars released throughout the world, 1971-75--Continued

Country and year released	Cultivar
Sudan:	
1971	Mexicani, Mexipak
	Hudeibas 57, Hudeibas 154, Hudeibas 164 1/
Sweden:	
1971	Amy
1973	Solid
1974	Sonett
Tanzania:	
1973	Kenya Kibeko (We904), Kenya Nyati (W3742), Kenya Mbweha (W3907), Kenya Swara (W3704)
Tunisia:	
1974	Carthage 74, Dougga 74, Fath 74
United States:	
Arkansas:	
1973	Early Arthur
1975	Doublecrop
California:	
1971	Inia 66R, Tanori 71, World Seed 1651
1973	Anza
1974	Lark
1975	Profit 75
Colorado:	
1971	Colano
1973	Baca
1974	Bounty 309

Table 1.--Wheat cultivars released throughout the world, 1971-75--Continued

Country and year released	Cultivar
Georgia:	
1971	Holley
Idaho:	
1971	Peak, Springfield
1972	Ark, Bannock, Dekalb, Franklin, Peak 72, Ranger, Twin
1974	Borak, Fielder, Hegler, Jeff, Peck
Illinois:	
1971	W406, W408, W433, W434
Indiana:	
1971	Arthur 71
1972	Abe, Vel
1973	Oasis
1975	Fuzz
Kansas:	
1974	Trison, Cloud, Kirwin, Sage
Massachusetts:	
1974	Piening
Michigan:	
1973	Tecumseh
Minnesota:	
1971	Bluebird 2
1972	Cajeme 71
1973	Produra, Prodax, Prospur
1975	Kitt
Missouri:	
1973	Stoddard

Table 1.--Wheat cultivars released throughout the world, 1971-75--Continued

Country and year released	Cultivar
Montana:	
1971	Shortana, Teton
1973	Norana
Nebraska:	
1971	Centurk
1973	Buckskin, Hiplains, Homestead, Sentinel
1975	Lancota
New York:	
1971	Arrow
1973	Ticonderoga
North Carolina:	
1972	McNair 701, McNair 4823
1973	McNair 1587
North Dakota:	
1971	Rolette
1973	Botno, Crosby, Ellar, Olaf, Rugby
1975	Tioga (Sawko)
Ohio:	
1974	Ruler, Signal
Oklahoma:	
1971	Chinofuz, Fulbarn, Gaucho, Kawfars, Nicoma, Teewon
1974	Osage
Oregon:	
1971	Hyslop
1973	McDermid, Rew

Table 1.--Wheat cultivars released throughout the world, 1971-75--Continued

Country and year released	Cultivar
South Carolina:	
1971	Coker-68-15
South Dakota:	
1973	Bronze, Hand
1974	Fleck, Gent
Texas:	
1972	TamW101
1973	TamW103
Utah:	
1974	Cardon, Hansel
Washington:	
1971	Coulee, Paha, Wandell
1973	Cerco, Norco, Wared
1975	Urquie
Uruguay:	
1971	Estanzuela Dolores, Estanzuela Tarariras, Estanzuela Young
Yugoslavia:	Ten varieties have been released since 1970; however, names of cultivars and year of release have not been received.
Zambia:	
1971	Idaed 59, White Federation 54
1974	Umniati, Z/C/13, Zambezi I, Zambezi II

[1] Year of release was not provided.

Table 2.--Supplemental listing of wheat cultivars released, 1967-70

Country and year released	Cultivar
Algeria:	
1969-70	Inca 66, Mexipak, Tobari
Argentina:	
1970	Buck Cimmarron, Buck Namuncura, Fontezuela, Klein Fortin
Australia:	
1968	Darkan, Wren
1969	Damset, Eagle, Gatcher, Halberd, Isis, Miljee
1970	Bokal, Duramba, Mersey
Brazil:	
1967	IAS-49-Pioneiro, IAS-50-Alverada, IAS-51-Albatroz
1968	D. Marco, Erexim, Missioneiro, Santa Barbara
1969	Cinquentendrio, IAS-52, Lagoa Vernelha, Nobre
1970	Encruzilhada, IAS-53, IAS-54, Ivai, Vila Rica
Chile:	
1970	Carifen 12, Galiafen, Likafen, Quilafen
England:	
1970	Cardinal, Maris Nimrod
Finland:	
1970	Veka
France:	
1968	Goya
1970	Agatha
Greece:	
1970	G 84865

Table 2.--Supplemental listing of wheat cultivars released, 1967-70--Continued

Country and year released	Cultivar
Iran:	
1969	Bezoskaya, Inia 66, Lerma Rojo 64A, Omid, Penjamo 62, Roshan, Tobari
Israel:	
1970	Miriam
Japan:	
1968	Hi Yoku-Komugi, Muka-Komugi, Omase-Komugi, Zenkoji-Komugi
1969	Haruminori, Kobushi-Komugi
Jordan:	
1968-69	Deir Alla No. 2, Deir Alla No. 3, Mexipak 65, Pitic 62
Kenya:	
1969	Kasuku, Kenya Sungura, Tai
1970	Twiga
Lebanon:	
1969	Jorc
Libia:	
1969-70	Inia 66, Sidi Mesril, Tobari
Mexico:	
1969	Juri
1970	Nuri 70, Potam 70, Saric 70, Yecora 70
Norway:	
1970	Lanor
Pakistan:	
1970	Barani 70, Chenab 70
Peru:	
1968	Hauncabamba, Haundoy
1970	Helvia Li, Tinajones, Tumi

Table 2.--Supplemental listing of wheat cultivars released, 1967-70--Continued

Country and year released	Cultivar
Rhodesia:	
1969	Devuli, Mexican 16, Odzi
Romania:	
1970	Lovrin 10, Lovrin 231
USSR:	
1968	Dzhany-Budai, Ferrugineum, Kokchetnoskaya, Saratov 39
1969	Albidium 11, Altyr-Bugdai, Galyaba, Kharkov 63, Nemchinobskaya 154, Odessa 51, Rubezh
Republic of South Africa:	
1968	Tosca
1969	Barta, Betta, Scheepers 69
1970	Belinda
Sudan:	
1969	Giza 155
Sweden:	
1968	Virgo
1969	Seba
Syria:	Chenab 70, Georgio 331, Inia 66, Jori, Lerma Rojo, Mexipak 65, Penjamo 62, Pitic 62, Siete Cerros, Syrimex [1]
Tunisia:	
1969	Penjamo
Turkey:	
1969	220/39, 1593
1970	Bezostaya, Bolol 2973, Kirce 66

Table 2.--Supplemental listing of wheat cultivars released, 1967-70--Continued

Country and year released	Cultivar
United States:	
Colorado:	
1970	Bounty 208
Illinois:	
1970	W332, W335, World Seed 1809
Kansas:	
1970	Eagle
Nebraska:	
1970	Scoutland
North Carolina:	
1970	Blueboy II, McNair 2203
Washington:	
1970	Luke

1/ Year of release was not provided.

Table 3.--Estimated frequency (in years) of race changes within the stem, leaf or stripe rust organism and specific examples of breakdown of resistance within cultivars throughout the world

Country or reporting location	Frequency of race change within rust 1/			Cultivar	Specific reaction according to years or dates	
	Stem	Leaf	Stripe		Resistant	Susceptible
			--	Gamut	--	--
Australia	10-12	5-7		Timgalen	10	--
Austria	10	--	--			
Belgium	--	6	--	Cama	1967	1973
Bolivia	--	--	4	Chinoli	1970	1974
Brazil	2-4	--	--			
Chile	--	--	3-5	Intermedio	1968	1973
Colombia	5	--	--			
Ecuador	--	--	3-5	Amazonas Atacazo	1971 1971	1974 1974
Ethiopia	3	--	--	Laketch		
Finland	2	--	--	Tahti	1972	1974
France	--	15	--	Etoile de Choisy	1950	1965
	--	--	12	Montferrier	1955	1968
Greece	--	--	9-10	Niki Pella	-- --	9 10

Guatemala	4-6	4-6	4-6	Xylepan	--	1
				Azteca	--	4
				Ciano F-67	--	4
India	--	5-7	5	Kalyansona	1967	1973
Kenya	5-6	--	5-6	2/		
Lebanon	--	6-7	5	Super X	--	--
				Mexipak 65	1967	1974
Mexico	4-5	--	--			
The Netherlands	--	--	1	Clement	--	--
				Cama	--	1
				Selpak	--	--
New Zealand	3-5	--	1-3	Mengavi 3/		
Pakistan	--	--	--	Chenab 70	--	3
				Barani	--	3
				SA-42	--	1
Republic So. Africa	--	4-5	--	Inia 66	1969	1973
Romania	--	3	--	Lovrin 10	1970	1973
Sudan	--	6	--			
United States:						
California	--	--	10	Pitic 62	1963	1973
Colorado	--	5-6	--			
Georgia	--	5	--	Holley	1969	1974

See footnotes at end of table.

Table 3.--Estimated frequency (in years) of race changes within the stem, leaf or stripe rust organism and specific examples of breakdown of resistance within cultivars throughout the world--Continued

Country or reporting location	Frequency of race change within rust 1/			Cultivar	Specific reaction according to years or dates	
	Stem	Leaf	Stripe		Resistant	Susceptible
Michigan	--	5	--			
Minnesota	--	3-4	--	Fletcher	1970	1973
Montana	--	--	6	Crest	1968	1974
Nebraska	--	3	--	Centurk	1971	1974
South Dakota	--	3-5	--	Bronze Gent 4/	-- --	-- --
Texas	--	1	--	Fox	1970	1971
Washington	--	--	4-5	Paha Conlee	-- --	4 4
Uruguay	--	--	5-7			
USSR	--	--	5/			
Yugoslavia	--	10	--			
Average	5.3	5.6	5.5			

1/ Numbers express years; dashes indicate no data.
2/ Varieties developed specifically for altitudes.
3/ Failed after 3 years in North Island
4/ Becoming susceptible.
5/ Lutescens 62 and Erithrospermum 841 have been cultivated 45 years and still occupy large acreages.